विज्ञान तथा प्रविधिः विकास र उत्पादन वृद्धि

बाह्रौ राष्ट्रिय विज्ञान दिवस, २०८१

स्मारिका

प्रकाशक

शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय,
सिंहदरबार, काठमाडौं

विज्ञान स्मारिका,

२०८१

नेपाल सरकार

शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय

सिंहदरबार, काठमाडौं

प्रकाशक:

नेपाल सरकार

शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय

सिंहदरबार, काठमाडौं

© प्रकाशकमा:

यस स्मारिकामा प्रकाशित लेख रचनाहरुमा अभिव्यक्त विचार लेखकका निजी हुन् ।

मुद्रण प्रति: ५००

प्रकाशन मिति: राष्ट्रिय विज्ञान दिवस, २०८१ असोज १

श्री विद्या भट्टराई
माननीय मन्त्री
शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय
सिंहदरबार, काठमाडौं, नेपाल

Mrs. Bidya Bhattarai
Hon'ble Minister
Ministry of Education, Science and Technology
Singhadurbar, Kathmandu, Nepal

पत्र संख्या/Let.No.:
चलानी नं./Ref. No.:

शुभकामना सन्देश

बाह्रौं राष्ट्रिय विज्ञान दिवस, २०८१ को अवसरमा सम्पूर्ण प्राध्यापक, वैज्ञानिक अनुसन्धानकर्ता, नवप्रवर्तक, उद्यमी, शिक्षक तथा विद्यार्थीलगायत विज्ञान र प्रविधिप्रेमी सबैमा हार्दिक शुभकामना व्यक्त गर्दछु।

देशको औद्योगिक तथा व्यापार क्षेत्रलाई समय सान्दर्भिक र सशक्त बनाई अर्थतन्त्रलाई सम्वृद्ध बनाउन कुल ग्रार्हस्थ उत्पादनमा प्रमुख योगदान दिने कृषि, वन, उर्जा, उद्योग, पर्यटनलगायतका क्षेत्रमा विज्ञान प्रविधि र नवप्रवर्तनको माध्यमबाट तत्कालै उत्पादन र उत्पादकत्व वृद्धि गर्ने प्रमुख चुनौती हामीसामु रहेको छ।

"विज्ञान तथा प्रविधिः विकास र उत्पादन वृद्धि" भन्ने नाराका साथ हामी यस वर्ष बाह्रौं राष्ट्रिय विज्ञान दिवस मनाइरहेका छौं। अनुसन्धानलाई उत्पादनसँग जोड्नु, विज्ञान प्रविधिको माध्यमबाट दिगो पूर्वाधारको विकास गर्नु र समग्ररूपमा विज्ञान प्रविधि तथा नवप्रवर्तनलाई समुदाय र समाजसँग जोड्ने यथार्थलाई बोध गरी यस वर्षको विज्ञान दिवसको नारा तय गरिएको छ। सोही परिलक्षित अभियानलाई सार्थकता प्रदान गर्न नेपाल सरकारका सबै निकाय, प्रादेशिक निकायहरू, स्थानीय निकायहरू, वैज्ञानिक सङ्गसंस्था, विज्ञानसम्बद्ध निकायहरूलाई नाराको मर्मबमोजिमका कार्यक्रम सञ्चालन गर्न पत्राचार भइसकेको छ। विज्ञान र प्रविधिको अनुसन्धान तथा नवप्रवर्तनका लागि विशेष कोषको स्थापना गरी सञ्चालन गर्न देशको बजेटको दुई प्रतिशत रकम छुट्याउने नीति चालु सोह्रौं योजनाले लिएको छ ।यसले विज्ञान प्रविधि र नवप्रवर्तनका क्षेत्रमा महत्त्वपूर्ण योगदान पुऱ्याउने अपेक्षा गरेको छु।

यस मन्त्रालयअन्तर्गत विज्ञान, प्रविधि र नवप्रवर्तनसम्बन्धी सङ्गठनहरू पुनःसंरचना गरी एकीकृत रणनीति बनाई कार्यक्रमहरू तय गर्ने योजना मन्त्रालयको रहेको छ। आम जनसमुदायमा विज्ञान र प्रविधिको आवश्यकता र महत्त्वका सम्बन्धमा सचेतना जागृत गर्दै प्रविधिको आवश्यकतालाई अभिवृद्धि गर्ने दिशामा यस वर्षको विज्ञान दिवस थप अर्थपूर्ण बन्न सकोस् भन्ने शुभकामना व्यक्त गर्दछु।

मितिः २०८१ असोज १

(विद्या भट्टराई)
मन्त्री
शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय

फोन नं.: ९७७-०१-४२००३५३ | फ्याक्स नं.: ९७७-०१-४२००३७३ | वेबसाइटः www.moest.gov.np
Tel No.: 977-01-4200353 | Fax No.: 977-01-4200373 | Website: www.moest.gov.np

नेपाल सरकार
शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय

पत्र संख्या:-
चलानी नं.:-

शुभकामना सन्देश

सिंहदरबार,
काठमाडौँ, नेपाल ।

आज असोज १ गतेका दिन **"विज्ञान तथा प्रविधिः विकास र उत्पादन वृद्धि"** आदर्श वाक्य सहित बाहौं राष्ट्रिय विज्ञान दिवस, २०८१ को उपलक्ष्यमा सम्पूर्ण वैज्ञानिक, प्राविधिक, विज्ञान शिक्षक, विद्यार्थी र विज्ञान प्रविधिको क्षेत्रमा पैरवी गर्नु हुने अभियान्ता सबैमा हार्दिक शुभकामना व्यक्त गर्दछु। विज्ञान प्रविधिको विकास तथा नवप्रवर्तन र वैज्ञानिक संस्कृतिको प्रवर्द्धनबाट नै विकासका पूर्वाधारहरु निर्माण हुने, उत्पादन र उत्पादकत्व वृद्धि भई नागरिकको गुणस्तरीय जीवनयापनमा सहयोग गर्दै समृद्ध नेपाल निर्माणमा योगदान पुग्छ। नेपालमा सूचना सम्प्रेषणको कमीले विज्ञान प्रविधिको क्षेत्रमा काम गर्ने वैज्ञानिक, प्राविधिक तथा नवप्रवर्तकहरूबाट भएका उपलब्धि र यस क्षेत्रको महत्वको बारेमा धेरैमा अनविज्ञता रहेको देखिन्छ। सार्वजनिक तथा निजी क्षेत्रमा कार्यरत वैज्ञानिक तथा प्राविधिक जनशक्तिको महत्वपूर्ण योगदान यस दिवसको सन्दर्भमा स्मरण गर्न चाहन्छु।

यस क्षेत्रमा संलग्न संघ संस्था वा व्यक्तिहरूको बारेमा सुसूचित गर्न वैज्ञानिक, प्राविधिक तथा नवप्रवर्तकहरूको मनोबल उच्च राख्न तथा यस विधाप्रति भावी पुस्तालाई चाख र रूचि बढाउन हरेक वर्ष आजकै दिन राष्ट्रिय विज्ञान दिवस मनाउने गरिएको सन्दर्भ उल्लेख गर्न चाहन्छु । विज्ञान, प्रविधि तथा नवप्रवर्तन नीति, २०७६ ले समाजसँग विज्ञान र उत्पादनसँग प्रविधि तथा नवप्रवर्तन आवद्ध गरी वैज्ञानिक चेतना अभिवृद्धि गर्दै विज्ञान र प्रविधि सम्बन्धी कार्यलाई एकीकृत र समन्वयात्मक रुपमा सञ्चालन गर्न जोड दिएको छ । नीतिको अवधारणाअनुरुप विज्ञान प्रविधि तथा नवप्रवर्तन सम्बन्धी विधेयकको अवधारणापत्र स्वीकृत भई छलफलको क्रममा रहेको छ। साथै व्यवहारिक विज्ञान प्रविधि तथा उद्योमदय कोष सम्बन्धी विधेयकको अवधारणा पत्र स्वीकृतिको लागि मन्त्रीपरिषदमा पेश गरिसकिएको छ। विज्ञान, प्रविधि, इन्जिनियरिङ र गणित (STEM) शिक्षा प्रवर्धनको लागि चाहिने प्रविधि विकास गर्न प्रतिस्पर्धात्मक कार्यक्रमहरू, विश्वविद्यालय अनुसन्धानकर्ता र निजी क्षेत्र बिचमा समन्वय गर्न डेक्स स्थापना गर्ने, ओपन डेटा प्लाटफर्मको निर्माण, प्रयोगशालाहरुको स्तरीकरण, विज्ञान कुटनीति प्रवर्धन जस्ता कार्यक्रमहरु यस वर्ष कार्यान्वयन हुदैँछ।

त्यसै गरी रेडियोधर्मी पदार्थ (उपयोग तथा नियमन) ऐन, २०७७ र नियमावली २०७८ जारी भए पश्चात ऐन नियम कार्यान्वयनको लागि आवश्यक पर्ने विकिरण सुरक्षा निर्देशिका, न्यूक्लियर मेडिसिन सम्बन्धी उपकरण र सेवा संचालन मापदण्ड, रेडियोडाइग्नोष्टिक उपकरण र सेवा संचालान सम्बन्धी मापदण्ड स्वीकृत भइ कार्यान्वयनका चरणमा छन्। सोही ऐनमा तोकिए बमोजिम नियमनकारी निकायको गठन र पारमाणविक अनुसन्धान केन्द्रको स्थापनाको कार्यक्रमहरू यस वर्ष सम्पादन गर्नुपर्ने छ। रासायनिक पदार्थको सुरक्षित प्रयोग, नियमन तथा जोखिम व्वस्थापन विधेयक परामर्शको क्रममा रहेको छ।

अन्त्यमा, शिक्षा विज्ञान तथा प्रविधि मन्त्रालय अन्तर्गतका नेपाल विज्ञान तथा प्रविधि प्रज्ञा प्रतिष्ठान, वी. पी. कोइराला मेमोरियल प्लानेटोरियम, अब्जरभेटरी र विज्ञान संग्रहालय, राष्ट्रिय विधि विज्ञान प्रयोगशाला साथै विज्ञान प्रविधि तथा नवप्रवर्तन क्षेत्रका सबै व्यावसायिक संघ संस्थाहरू, विश्वविद्यालयहरू, अनुसन्धान केन्द्रहरू तथा स्वतन्त्र वैज्ञानिक प्राविधिकहरूलाई यस क्षेत्रमा गरेका योगदानका लागि धन्यवाद दिँदै विज्ञान दिवस हर्षोउल्लासका रूपमा मनाई दिगो विकासको लागि महत्वपूर्ण भूमिका निर्वाह गर्नुहुन सबैमा अनुरोध गर्दछु ।

(विश्वबाबु पुडासैनी)
सचिव
(शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय)

मितिः २०८१ असोज १ गते

फोन नं.:
वेबसाइटः www.moest.gov.np

विज्ञान स्मारिका प्रकाशन उपसमिति:

क. श्री दिनानाथ मिश्र, सहसचिव, शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय	संयोजक
ख. श्री अस्बिना बराल, उपसचिव (प्रा.), शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय	सदस्य
ग. डा. विमला देवी देवकोटा, मुख्य वैज्ञानिक अधिकृत, नेपाल विज्ञान तथा प्रविधि प्रज्ञा-प्रतिष्ठान	सदस्य
घ. श्री विकास गुरुङ, अध्यक्ष, रोबोटिक्स एसोसिएसन अफ नेपाल	सदस्य
ङ. श्री हरि उपाध्याय, निरिक्षक, शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय	सदस्य

डिजाइन:

क. श्री दिपक विष्ट, अध्यक्ष, रोबोटिक्स एसोसिएसन अफ नेपाल सुदूरपश्चिम

ख. श्री पल्लव खनाल, सदस्य, रोबोटिक्स एसोसिएसन अफ नेपाल

ग. श्री मनोज वि.क., कम्प्युटर अपरेटर, शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय

विषय सूची

लेखक	शीर्षक	पाना नं.
ई. शैलेन्द्र खत्री	फलफूल खेतीमा कृषि इन्जिनियरिङ्ग प्रविधि	1
सुरेश भट्टराई	खगोल पर्यटन : कोशी प्रदेशको नयाँ आयाम	10
नराजन शर्मा	न्यायको तराजुमा विज्ञान: नेपालको अदालतहरूमा वैज्ञानिक प्रमाणको प्रयोग र चुनौतीहरू	12
केशब राज जोशी	प्लाष्टिकजन्य प्रदूषण नियन्त्रणका प्रयासहरु	18
प्रा. डा. लालप्रसाद अम्गाई	वैज्ञानिक अनुसन्धान एवं प्राज्ञिक उन्नयनमा नेपाली विश्वविद्यालय र विश्वविद्यालय अनुदान आयोग	24
सह–प्रा. डा. लोकबहादुर बराल	चडो सेवा प्रविधि (सतही रोपवे, Surface Ropeway)	28
छविन्द्र पराजुली	लघु, घरेलु तथा साना उद्योग प्रवर्द्धन केन्द्रबाट उद्यमशीलता विकास र नवप्रवर्तनका क्षेत्रमा हासिल गरेका मुख्य मुख्य उपलब्धीहरु: एक समिक्षा	32
डम्बरु प्रसाद पोखरेल	नेपालको बदलिदो विद्यालय विज्ञान शिक्षा, एक परिदृस्य	38
Ankit Khanal	Nepal's Space Journey: Challenges, Opportunities, and the Need for a Strong Foundation	45
Anuj Mishra	Intersection Control Evaluation for Highway Safety Analysis	48
Er. Bikash Gurung	Rakshyak: AI Module Early Warning System	55
Er. Bimal Bhattarai	Digitization in Aviation Maintenance Management: Current Landscape and Future Prospects	61
Ekata Shrestha	Investigating the Integration of Renewable Energy Solutions in Heritage Sites	65
Geeta Bashyal	Engineering Approach to Reliability for Safety and Quality Assurance of Nepalese Aircraft	69

Kamal Kanta Dhungel	Importance of Sci-fi in Science Curriculum	74
Miksen Rai	Understanding New Urban Agenda & Nepal's involvement	77
Omkar Jaiswal	Seed Bombing Drone	81
Mr. Ram Bahadur Khadka	Urinary Tract Infections: Emerging Technologies and Challenges	89
Er. Roshan Pandey	NAST's Fuel Cell Innovation	94
Sadixhya Pandey	Significance of Structural Assessment of Electrically Retrofitted Conventional Vehicles	97
Sandip Sapkota	Current Policies and Future Policy Needs on Science, Technology, and Innovation in Nepal	100
Sangita Adhikari	Why Local Voices Matter: The Importance of Community Involvement in Land Use Visioning	108
Saugat Chand	Assessing Air Pollution in Kathmandu Valley: An Analytical Study	112
Shailendra Shah	Insight on Additive Manufacturing (3D Printing)	121

Current Policies and Future Policy Needs on Science, Technology, and Innovation in Nepal

Sandip Sapkota
National Investigation Department
sapkotasandip6767@gmail.com
+977-9845899265

Abstract

This article examines the current landscape of science, technology, and innovation (STI) policies in Nepal and explores the future policy needs to foster technological advancement and economic growth. Through a comprehensive analysis of existing legislation, policy frameworks, and scholarly works, we identify key areas of progress and persistent challenges. The study reveals that while Nepal has made significant strides in developing STI policies, there remain substantial gaps in implementation, funding, and alignment with global technological trends. Future policy needs are discussed, emphasizing the importance of increased research and development investment, education reform, and stronger industry-academia collaboration. This research contributes to the ongoing dialogue on STI policy in developing nations and offers actionable insights for policymakers and stakeholders in Nepal.

Keywords: *Science and Technology Policy, Innovation Ecosystems, Digital Infrastructure, Research and Development, Brain Drain, Sustainable Technologies.*

Introduction

In an era defined by rapid technological advancement, the role of science, technology, and innovation (STI) in driving economic growth and social development has become increasingly crucial. For developing nations like Nepal, harnessing the power of STI is not just an option but a necessity to address pressing socio-economic challenges and to compete in the global knowledge economy. This article aims to provide a comprehensive overview of the current STI policies in Nepal and to identify future policy needs that could propel the nation towards sustainable development and innovation-led growth.

Nepal, a landlocked country nestled in the Himalayas, has made significant progress in recent years in recognizing the importance of STI in its development agenda. However, the country faces unique challenges due to its geographical constraints, political transitions, and limited resources. Understanding these contextual factors is crucial in assessing the effectiveness of current policies and in formulating future policy directions. This article will delve into the existing policy frameworks, analyze their strengths and weaknesses, and explore the potential avenues for policy enhancements. By drawing on the works of both Nepali and international scholars, as well as examining relevant legislation, we aim to present a nuanced and well-rounded perspective on the subject.

Current STI Policies in Nepal:-

National Science and Technology Policy

The cornerstone of Nepal's STI framework is the National Science and Technology Policy, first introduced in 1989 and subsequently revised in 2005 and 2019. The latest iteration, the Science, Technology and Innovation Policy 2019, represents a significant step forward in Nepal's commitment to leveraging STI for national development (Ministry of Education, Science and Technology [MoEST], 2019). This policy outlines several key objectives:

1. Enhancing research and development capabilities
2. Promoting innovation and entrepreneurship
3. Strengthening the linkages between academia, industry, and government
4. Developing human resources in STI fields
5. Improving infrastructure for scientific research and technological development

According to Dhungel and Sapkota (2021), the 2019 policy marks a paradigm shift in Nepal's approach to STI, moving from a linear model of innovation to a more holistic, systems-based approach. This shift acknowledges the complex interplay between various stakeholders in the innovation ecosystem and aims to foster a more collaborative environment for technological advancement.

Digital Nepal Framework

Recognizing the transformative potential of digital technologies, the Government of Nepal introduced the Digital Nepal Framework in 2019. This comprehensive policy document outlines the vision and strategies for leveraging digital technologies across various sectors of the economy (Ministry of Communication and Information Technology [MoCIT], 2019). The framework identifies eight key domains for digital intervention:

1. Digital Foundation
2. Agriculture
3. Health
4. Education
5. Energy
6. Tourism
7. Finance
8. Urban Infrastructure

Scholars like Paudel and Subedi (2020) argue that the Digital Nepal Framework represents a significant step towards bridging the digital divide and fostering inclusive growth. However, they also highlight the challenges in implementation, particularly in terms of infrastructure development and digital literacy.

Intellectual Property Rights Policy

The Intellectual Property Rights Policy, introduced in 2017, aims to create a conducive environment for innovation by protecting intellectual property and promoting its commercialization (Ministry of Industry, Commerce and Supplies [MoICS], 2017). This

policy is particularly significant in the context of STI as it provides the legal framework for protecting innovations and incentivizing research and development.

Adhikari (2018) notes that while the policy is comprehensive in its scope, covering patents, trademarks, copyrights, and traditional knowledge, its effectiveness is hampered by weak enforcement mechanisms and limited awareness among stakeholders.

Biotechnology Policy

The National Biotechnology Policy, introduced in 2006, recognizes the potential of biotechnology in addressing national priorities in agriculture, health, and industry (Ministry of Science and Technology, 2006). The policy aims to promote research and development in biotechnology, develop human resources, and facilitate technology transfer.

However, as pointed out by Gartaula et al. (2020), the implementation of this policy has been slow, primarily due to limited financial resources and inadequate infrastructure. They argue for a more focused approach, prioritizing areas where Nepal has a comparative advantage, such as medicinal plants and high-altitude agriculture.

Challenges in Current Policy Implementation

Despite the existence of these policies, several challenges hinder their effective implementation:

1. **Limited Financial Resources:** Nepal's investment in research and development remains low, at approximately 0.3% of GDP (UNESCO Institute for Statistics, 2021). This underfunding severely constrains the country's ability to implement ambitious STI policies.
2. **Inadequate Infrastructure:** Many research institutions and universities lack state-of-the-art facilities and equipment, limiting their capacity for cutting-edge research (Subedi et al., 2019).
3. **Brain Drain:** The exodus of skilled professionals to other countries poses a significant challenge to Nepal's STI development (Bhattarai, 2018).
4. **Weak Industry-Academia Linkages:** There is a persistent gap between academic research and industry needs, resulting in low commercialization of research outputs (Paudel, 2021).
5. **Limited Digital Access:** Despite progress, a significant portion of the population, particularly in rural areas, lacks access to digital technologies, hindering the implementation of digital initiatives (Regmi, 2017).

Future Policy Needs

To address these challenges and to align Nepal's STI policies with global trends and national development goals, several key areas require attention:

1. Increased R&D Funding: There is an urgent need to increase investment in research and development. Scholars like Sharma and Dahal (2022) argue for a gradual increase in R&D expenditure to at least 1% of GDP over the next decade. This increase should be accompanied by transparent allocation mechanisms and rigorous evaluation processes to ensure efficient use of resources.

2. Education Reform: The education system plays a crucial role in developing the human capital necessary for STI advancement. Future policies should focus on:

- Integrating STEM education at all levels of schooling
- Promoting critical thinking and problem-solving skills
- Encouraging interdisciplinary approaches to education
- Enhancing vocational and technical education programs

Acharya and Ghimire (2021) propose a comprehensive overhaul of the science curriculum, emphasizing hands-on learning and real-world applications.

3. Strengthening Industry-Academia Collaboration: Future policies should create stronger incentives for collaboration between universities, research institutions, and private sector companies. This could include:

- Establishing joint research centers
- Creating industry-sponsored PhD programs
- Developing technology transfer offices in universities
- Implementing tax incentives for companies investing in R&D

Poudel (2020) suggests adopting a "triple helix" model of innovation, fostering close cooperation between government, academia, and industry.

4. Enhancing Digital Infrastructure: To fully leverage the potential of digital technologies, future policies should prioritize:

- Expanding broadband internet access, particularly in rural areas
- Developing secure and interoperable e-government platforms
- Promoting digital literacy programs
- Investing in cybersecurity infrastructure

The work of Regmi and Pandey (2019) highlights the potential of public-private partnerships in accelerating digital infrastructure development.

5. Promoting Innovation Ecosystems: Future policies should focus on creating a more supportive environment for startups and innovative enterprises. This could include:

- Establishing technology incubation centers
- Developing venture capital and angel investor networks

- Streamlining regulations for technology startups
- Creating innovation zones or technology parks

Shrestha and Bhattarai (2023) argue for the creation of a national innovation fund to provide seed funding for promising startups.

6. Addressing Brain Drain: To mitigate the loss of skilled professionals, future policies should:

- Improve working conditions and career prospects for researchers
- Develop programs to attract Nepali diaspora scientists
- Create international research collaborations
- Establish centers of excellence in priority research areas

Bhattarai (2018) proposes a "brain circulation" model, encouraging temporary return and knowledge transfer from diaspora scientists.

7. Focusing on Sustainable Technologies: Given Nepal's vulnerability to climate change, future STI policies should prioritize research and innovation in:

- Renewable energy technologies, particularly in hydropower and solar energy
- Climate-resilient agriculture
- Disaster risk reduction technologies
- Sustainable urban planning and green technologies

The work of Gurung et al. (2021) underscores the potential of indigenous knowledge in developing sustainable technologies suitable for Nepal's unique geographical context.

8. Strengthening Intellectual Property Rights: To foster innovation and attract foreign investment, future policies should focus on:

- Strengthening enforcement mechanisms for IP protection
- Developing specialized IP courts
- Raising awareness about IP rights among researchers and entrepreneurs
- Streamlining the patent application process

Adhikari and Karki (2022) advocate for the establishment of a dedicated IP office to coordinate and streamline IP-related activities.

9. Enhancing International Collaboration: Future policies should facilitate greater international scientific cooperation through:

- Participating in global research initiatives
- Developing bilateral and multilateral STI cooperation agreements

- Encouraging joint research projects with international partners
- Facilitating researcher mobility and exchange programs

Pandey et al. (2020) highlight the potential of South-South cooperation in addressing shared development challenges through STI.

10. Developing Ethical Guidelines: As Nepal advances in emerging technologies, there is a need for comprehensive ethical guidelines, particularly in areas such as:

- Artificial Intelligence and machine learning
- Biotechnology and genetic engineering
- Data privacy and digital rights
- Nanotechnology

Sapkota and Paudel (2024) emphasize the importance of involving diverse stakeholders in developing these guidelines to ensure they reflect Nepali values and contexts.

Conclusion

Nepal stands at a critical juncture in its development trajectory, and the role of science, technology, and innovation in shaping its future cannot be overstated. While the country has made significant strides in developing comprehensive STI policies, the challenges in implementation remain substantial. The future policy needs outlined in this article provide a roadmap for addressing these challenges and harnessing the full potential of STI for Nepal's development.

Key to the success of these future policies will be a coordinated and sustained effort from all stakeholders - government, academia, industry, and civil society. Moreover, these policies must be flexible and adaptive, capable of responding to the rapidly changing global technological landscape while addressing Nepal's unique socio-economic context.

As Nepal strives to achieve its development goals and transition to a knowledge-based economy, the strategic focus on STI will be crucial. By addressing the policy needs identified in this article, Nepal can create an enabling environment for innovation, foster technological advancement, and pave the way for sustainable and inclusive growth.

The journey ahead is challenging, but with the right policies and commitment, Nepal has the potential to emerge as a hub of innovation in the region, leveraging its unique geographical and cultural assets to create technological solutions that are not only locally relevant but globally significant.

References

1. Acharya, K. P., & Ghimire, T. R. (2021). A paradigm shift in science education in Nepal: Challenges and opportunities. ***Journal of Education and Research***, 11(1), 1-15.
2. Adhikari, K. (2018). Intellectual property rights in Nepal: Challenges and opportunities. ***Journal of Intellectual Property Rights***, 23(2-3), 86-97.
3. Adhikari, P., & Karki, S. (2022). Strengthening the intellectual property regime in Nepal: A pathway to innovation and economic growth. ***Nepal Journal of Legal Studies***, 15(2), 45-62.
4. Bhattarai, P. (2018). Brain drain and its impact on Nepal's higher education: The role of governance. ***Higher Education Policy***, 31(4), 471-485.
5. Dhungel, K. R., & Sapkota, V. (2021). Science, technology and innovation policy in Nepal: A critical analysis. ***Journal of Science Policy & Governance***, 18(1), 1-15.
6. Gartaula, H., Patel, K., & Johnson, D. (2020). Biotechnology research and development in Nepal: Current status and future prospects. ***Journal of Crop Improvement***, 34(3), 291-310.
7. Gurung, A., Karki, R., & Bista, R. (2021). Indigenous knowledge in climate change adaptation: A case study of Nepal. ***Environmental Science & Policy***, 118, 49-57.
8. Ministry of Communication and Information Technology. (2019). ***Digital Nepal Framework***. Government of Nepal.
9. Ministry of Education, Science and Technology. (2019). ***Science, Technology and Innovation Policy 2019***. Government of Nepal.
10. Ministry of Industry, Commerce and Supplies. (2017). ***Intellectual Property Rights Policy***. Government of Nepal.
11. Ministry of Science and Technology. (2006). ***National Biotechnology Policy***. Government of Nepal.
12. Pandey, C. L., Adhikari, S., & Sapkota, B. (2020). South-South cooperation in science, technology and innovation: A case study of Nepal. ***Development Policy Review***, 38(S1), O50-O67.
13. Paudel, K. P. (2021). University-industry linkages in Nepal: Challenges and opportunities. ***Industry and Higher Education***, 35(3), 217-229.
14. Paudel, S., & Subedi, B. P. (2020). Digital Nepal: Opportunities and challenges. ***Journal of Education and Research***, 10(1), 1-19.
15. Poudel, K. N. (2020). Triple helix model of innovation: An analytical framework for Nepal. ***Journal of Policy Research,*** 5(1), 15-30.
16. Regmi, N. (2017). Expectations versus reality: A case of internet in Nepal. ***The Electronic Journal of Information Systems in Developing Countries***, 82(1), 1-20.

Government of Nepal
Ministry of Education,
Science and Technology

12TH NATIONAL SCIENCE DAY 2081

विज्ञान तथा प्रविधि: विकास र उत्पादन वृद्धि
राष्ट्रिय विज्ञान दिवस - २०८१
NATIONAL SCIENCE DAY-2081
Science and Technology: Development and Production Growth
शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय

नेपाल सरकार
शिक्षा, विज्ञान तथा प्रविधि मन्त्रालय

स्मारिका

Date : Ashwin 1, 2081